

What is claimed is:

Claims

1. An apparatus comprising:

a fuel injector operably connected to a fluid supply system and having a nozzle with a fluid cavity;

at least one discharge port disposed in the nozzle;

an orifice disposed in the nozzle; and

a pressure sensor adjacent to the orifice, wherein fluid in the fluid cavity is in communication with the pressure sensor, such that the pressure sensor measures fluid pressure.

2. The apparatus of claim 1, wherein the nozzle is mounted to and protrudes into a chamber for the receiving of fluid from the discharge ports.
3. The apparatus of claim 2, wherein the chamber is a combustion chamber.
4. The apparatus of claim 2, wherein the chamber is pressurized.
5. The apparatus of claim 4, further comprising a pressure control valve operably connected to the chamber.
6. The apparatus of claim 2, further comprising a flow-metering unit operably connected to the chamber.
7. The apparatus of claim 1, wherein the fluid supply system comprises a fluid tank and a fuel pump.
8. The apparatus of claim 1, further comprising a monitoring device attached to the pressure sensor.
9. The apparatus of claim 1, wherein the pressure sensor is a piezoelectric quartz transducer.

10. A fuel injector comprising:

a nozzle having at least one discharge port;

a needle slideably mounted inside the fuel injector and the nozzle;

a fluid cavity disposed in the nozzle; and

a pressure sensor in fluid communication with the fluid cavity.

11. The apparatus of claim 10, further comprising an orifice disposed along an outer boundary of the fluid cavity and disposed in the nozzle, wherein the pressure sensor is disposed in the orifice.

12. The apparatus of claim 10, further comprising an orifice disposed in the needle and disposed along an outer boundary of the fluid cavity, wherein the pressure sensor is disposed in the orifice.

13. The apparatus of claim 10, wherein the pressure sensor is a piezoelectric quartz transducer.

14. A method comprising the steps of:

charging a fuel injector with fluid;

discharging the fluid from at least one discharge port in a nozzle of the fuel injector;

communicating fluid to a pressure sensor through a first orifice disposed in the nozzle; and

measuring fluid pressure near the at least one discharge port with the pressure sensor.

15. The method of claim 14, further comprising the step of communicating fluid to the pressure sensor through a second orifice in a needle inside the nozzle of the fuel injector.

16. The method of claim 14, further comprising the step of containing the fluid discharged from the nozzle in a chamber.

17. The method of claim 16, further comprising the step of controlling the operating pressure of the chamber.

18. The method in claim 16, further comprising the step of combusting the fluid inside the chamber.

19. The method of claim 14, further comprising the step of measuring the fluid discharge rate after each discharge of fluid from the nozzle of the fuel injector.

20. The method of claim 14, wherein the pressure sensor is a piezoelectric quartz transducer.